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Instruction Manual

JOHN FLUKE MFG. CO., INC.

OFFUTT AIR FORCE BASE STATION
APR 15 1968

ELECTRONICS FOR INDUSTRY

FLUKE

INSTRUMENTS / COMPONENTS

Preliminary Instruction Manual

for

FLUKE MODEL 853A

DIFFERENTIAL MULTIMETER

Serial No. 123 and above

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DIFFERENTIAL MULTIMETER

October 20, 1967

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SECTION I

INTRODUCTION AND SPECIFICATIONS

1-1. INTRODUCTION

1-2. The Fluke Model 853A Differential Multimeter is a compact transistorized multimeter which allows conventional or differential measurement of dc or ac voltage, dc or ac current, and resistance. Voltage measurements may be made from zero volts to 1000 volts in four ranges. Current measurements from zero to 10 amperes are made in six ranges. Resistance measurements from zero to 100 megohms are made in seven ranges. The use of one meter scale for all ranges greatly simplifies all measurements. When the instrument is operated in the differential mode, an in-line digital readout is available from the front panel readout dials.

1-3. The Model 853A is designed for portable field or factory applications as well as for laboratory use and operates from line power or an internal 22 1/2 volt battery. The carbon battery may be replaced with a rechargeable nickel-cadmium battery pack by installation of option kit 853A-701. Upon installation of this option kit, the instrument is identified as the Model 853A-01 by a rear panel metal decal, included with the option kit. A tilt down carrying handle detents into the instrument's feet to serve as a tilt bail during bench top use of the instrument.

1-4. SPECIFICATIONS

1-5. DC VOLTMETER

RANGE
1, 10, 100, 1000 volts dc with 10% overranging capability.

ACCURACY
Differential
±(0.2% of reading + 0.02% of range).
Direct
±2% of full-scale.

INPUT RESISTANCE
11 megohms.

1-6. AC VOLTMETER

RANGE
1, 10, 100, 1000 volts ac with 10% overranging capability.

ACCURACY
Differential
±(0.5% of reading + 0.05% of range) from 30 Hz to 20 kHz.
±(1% of reading + 0.05% of range) from 20 Hz to 30 kHz.
Direct
±2% of full scale from 20 Hz to 30 kHz.

INPUT IMPEDANCE
1 megohm.

1-7. DC AMMETER

RANGE
100 microampere, 1 milliampere, 10 milliampere, 100 milliampere, 1 ampere, 10 ampere.

ACCURACY
Differential
±(0.2% of reading + 0.02% of range)
±(0.5% of reading + 0.05% of range) on 10 ampere range.
Direct
±2% of full-scale.

INSERTION LOSS
100 to 300 millivolt drop on all ranges.

1-8. AC AMMETER

RANGE
100 microampere, 1 milliampere, 10 milliampere, 100 milliampere, 1 ampere, 10 ampere.

ACCURACY
Differential
±(0.5% of reading + 0.05% of range) from 30 Hz to 10 kHz.
±(0.5% of reading + 0.05% of range) from 30 Hz to 3 kHz on 10A range.
±(1% down to 20 Hz).
Direct
±3% of full-scale from 20 Hz to 20 kHz.

INSERTION LOSS
100 to 300 millivolt drop on all ranges.

1-9. OHMMETER

RANGE
100 ohms, 1 kilohm, 10 kilohm, 100 kilohm, 1 megohm, 10 megohm, 100 megohm.

ACCURACY
Differential
±(0.2% of reading + 0.01% of range)
±(0.5% of reading above 10 megohms)
Direct
±3% of full scale.

1-10. ENVIRONMENTAL

OPERATING TEMPERATURE RANGE
Meets all specifications from 10°C to 40° C derated at 100 ppm/° C + 30 ppm of range beyond these limits to 0° C and 55° C.

STORAGE TEMPERATURE RANGE
Model 853A -40° C to +70° C.
Model 853A-01 -40° C to +50° C.

HUMIDITY
Within specifications up to 70% relative humidity.

SHOCK
Meets requirements of MIL-E-16400F.

VIBRATION
Meets requirements of MIL-T-945A and MIL-E-16400F.

1-11. GENERAL

ELECTRICAL DESIGN
Completely solid state.

OVERLOAD PROTECTION
Withstands 1200 volts rms on any voltage range; 12 amperes rms on 10 ampere range, 2 amperes on all other current ranges (fused above 2 amperes); 120 volts rms on the 100 ohm through 10 kilohm ranges; 230 volts rms on the 100 kilohm through 100 megohm ranges.

SEMICONDUCTOR PROTECTION
The Model 853 will not injure typical semiconductors in any range or mode.

INPUT POWER

MODEL 853A. 115/230 volts ac ±10%, 50 to 500 Hz, at approximately 3 watts, or 22 1/2 volt "B" battery which provides 80 hours of operation.

MODEL 853A-01. 115/230 volts ac ±10%, 50 to 500 Hz, at approximately 6 watts. Minimum of 40 hours operation on rechargeable nickel-cadmium batteries.

1-12. MECHANICAL

SIZE
11 1/2" wide by 5 1/4" high by 9" deep.

WEIGHT
Approximately 10 lbs.

OPTION KIT 853A-701
Used to convert the Model 853A battery power from a carbon battery to rechargeable nickel-cadmium batteries.

SECTION II

OPERATING INSTRUCTIONS

2-1. CONTROLS, TERMINALS, AND INDICATORS.

2-2. The function of the Model 853A controls, terminals, and indicators are listed in Figure 2-1.

2-3. PRELIMINARY OPERATING PROCEDURES

2-4. Connect the Model 853A line plug to 115 volts ac or to 230 volts ac, if the instrument is so wired. If your instrument is a Model 853A, perform steps a through c. If your instrument is a Model 853A-01, perform steps a, b, and d.

WARNING!

The round pin on the polarized three-prong plug connects the instrument case to power system ground. Use a three-to-two pin adapter when connecting to a two-contact outlet. For personnel safety, connect the short lead from the adapter to a high quality ground.

a. Place the MODE and RANGE switches to the desired measurement positions.

b. To operate your instrument on the internal batteries, hold the MODE switch to the BAT CHK position and note the meter reading. Minimum acceptable meter deflection is 0.2. If the batteries are adequately charged, disconnect the line power cord. The instrument will now operate on the internal batteries when the MODE switch is placed to the desired measurement mode.

c. If the Model 853A fails the battery check, replacement of the battery is necessary. Refer to paragraph 2-19 for battery replacement.

d. If the Model 853A-01 fails the battery check, operate the instrument on line power until the batteries are adequately charged. Should the batteries fail the battery check after the instrument has been operated for 16 hours on line power, replacement of the batteries may be necessary. Refer to paragraph 2-19 for battery replacement.

CONTROLS TERMINALS AND INDICATORS	FUNCTION
INPUT terminals	Provide connection to the circuit being measured. The 10 AMP terminals are used for connection to circuits for current measurements of above 1 ampere to a maximum of 10 amperes.
Meter	A single linear meter scale for all modes and ranges is used. Meter deflection is from left to right on the direct mode with a center-zero reference used on the differential mode.
RANGE switch	Selects the desired range for measurements of current, voltage, or resistance.
BAT CHG lamp	When lit, indicates that the Model 853A-01 is operating on line power and the batteries are being charged.
MODE switch	Provides selection of direct (DIR) or differential (DIFF) mode for measurement of ac current or voltage, dc current or voltage, or resistance. Resistance measurements are made with the MODE switch to the +DC positions. The MODE switch positions of +DC and -DC allow measurement of positive or negative dc voltage or current without switching of the test leads. The Model 853A BAT CHK position is spring-loaded to return to the OFF position. When the MODE switch is held to BAT CHK position, the meter will indicate the charge-state of the internal batteries. A meter deflection of 0.2 is the minimum acceptable value.
NULL SENS control	Adjust differential null sensitivity for an on-scale meter deflection. May also be used on the differential mode to calibrate end-scale deflection of the meter to be any desired percentage of input range.
Readout dials	Provide an in-line digital readout of the measured voltage, current, or resistance.

Figure 2-1. CONTROLS, TERMINALS AND INDICATORS

2-5. OPERATION AS A CONVENTIONAL DC VOLTMETER OR AMMETER

a. Perform the preliminary operating procedures of paragraph 2-3.

b. Place the Model 853A controls as follows:

MODE	+DC DIR
RANGE	1000 VOLTS or 1000 M A position. (The 10A position is used with an input to the 10 AMP INPUT terminals only).

c. Connect the circuit to be measured to the INPUT terminals. For current measurements in excess of 1 ampere, connect the measured circuit to the 10 AMP INPUT terminals.

d. Place the MODE switch to the appropriate +DC DIR or -DC DIR position to achieve a meter deflection from left to right.

e. Place the RANGE switch to the lowest voltage or current range possible while maintaining an on-scale meter deflection. The meter indication, multiplied by the RANGE switch position, is the value of the measured dc current or voltage.

2-6. OPERATION AS A DC DIFFERENTIAL VOLTMETER OR AMMETER

2-7. An improved accuracy of at least 10 times over that of the direct mode is available on the differential mode. To operate the instrument on the dc differential mode proceed as follows:

a. Determine the approximate value and polarity of the measured voltage or current by performing the operations contained in paragraph 2-5.

b. Place the readout dials to the meter deflection value of paragraph 2-5, step e.

c. Rotate the MODE switch one position clockwise to the DIFF position.

d. Rotate the NULL SENS control to achieve an on-scale meter deflection.

e. Rotate the readout dials for a center-zero meter indication while rotating the NULL SENS control to theHI (maximum clockwise) position.

f. The readout dials digit value multiplied by the RANGE switch position is the value of the measured dc current or voltage

2-8. OPERATION AS A CONVENTIONAL AC VOLTMETER OR AMMETER

a. Perform the preliminary operating procedures of paragraph 2-3.

b. Place the Model 853A controls as follows:

MODE	AC DIR
RANGE	1000 VOLTS or 1000 M A position. (The 10A position is used with an input to the 10 AMP INPUT terminals only.)

c. To prevent ground loop errors, it is recommended that the Model 853A be operated with the line cord unplugged (using battery power) or with a three prong to two prong line cord adaptor (floating the chassis from power line ground).

d. Connect the circuit to be measured to the INPUT terminals. For current measurements in excess of 1 ampere, connect the measured circuit to the 10 AMP INPUT terminals.

e. Place the RANGE switch to the lowest voltage or current range possible while maintaining an on-scale meter deflection. The meter indication, multiplied by the RANGE switch position, is the value of the measured ac current or voltage.

2-9. OPERATION AS AN AC DIFFERENTIAL VOLTMETER OR AMMETER

2-10. An improved accuracy of at least 10 times over that of the direct mode is available by the use of the differential mode. To operate the instrument on the ac differential mode proceed as follows:

a. Determine the approximate value of the measured voltage or current by performing the operations contained in paragraph 2-8.

b. Place the readout dials to the meter deflection value of paragraph 2-8, step .

c. Rotate the MODE switch clockwi e to the AC DIFF position.

d. Rotate the NULL SENS control to achieve an on-scale meter deflection.

e. Rotate the readout dials for a center-zero meter indicati n while rotating the NULL SENS control toward the HI (maximum clockwise) position.

NOTE:

When the NULL SENS control is to the HI position, meter sensitivity is approximately 0.1% full-scale which may cause excessive meter noise to be observed. If excessive meter noise is observed, reduce the NULL SENS to about one per cent full scale by rotating the vernier readout dial one per cent in either direction from the nulled value, and adjust the NULL SENS control for a full-scale meter indication. The vernier readout dial is then readjusted for a center-zero meter indication.

f. The readout dials digit value, multiplied by the RANGE switch position, is the value of the measured ac current or voltage.

2-11. OPERATION AS A CONVENTIONAL OHMMETER

a. Perform the preliminary operating procedures of paragraph 2-3.

b. Place the Model 853A controls as follows:

MODE	+DC DIR
RANGE	OHMS (as desired)

c. Connect the circuit or the resistance to be measured to the INPUT terminals. If one side of the resistance is at a ground potential, that side should be connected to the negative (-) input terminal.

d. Place the RANGE control to the OHMS position that maintains an on-scale meter deflection. The meter indication multiplied by the RANGE switch position is the value of the measured resistance.

2-12. OPERATION AS A DIFFERENTIAL OHMMETER

2-13. An improved accuracy of at least 10 times over that of the direct mode is available by the use of the differential ohmmeter mode. To operate the instrument as a differential ohmmeter proceed as follows:

a. Determine the approximate value of the measured resistance by performing the operations contained in paragraph 2-11.

b. Place the readout dials to the meter deflection value of paragraph 2-11, step d.

c. Rotate the MODE switch clockwise to the +DC DIFF position.

d. Rotate the NULL SENS control to achieve an on-scale meter deflection.

e. Rotate the readout dials for a center-zero meter indication while rotating the NULL SENS control to the HI (maximum clockwise) position.

f. The readout dials digit value, multiplied by the RANGE switch position, is the value of the measured resistance.

2-14. SERVICING INFORMATION

2-15. The John Fluke Manufacturing Co., Inc. warrants each instrument manufactured by them for the period of one year upon making delivery of the instrument to you, the original purchaser. Complete warranty information is contained in the Warranty page located at the rear of this manual.

2-16. If you should encounter any problem in the operation of your instrument, please feel free to contact your nearest John Fluke Sales Representative or write directly to the John Fluke Manufacturing Co., Inc. with a statement of your problem.

2-17. AMMETER OVERLOAD FUSE REPLACEMENT

2-18. Current measurements in RANGE switch positions of 1000 MA and below, which inadvertently exceed 2 amperes, are prevented from damaging the instrument circuits by fuse F1. The instrument may still be operated on the voltage or resistance modes after the fuse is blown, but the ammeter function is disabled. Replacement of the fuse, F1, is accomplished in the following manner:

a. Remove the four screws that attach the bottom dust cover to the instrument.

b. Locate the fuse F1 on the RANGE switch. The fuse is connected from deck one to deck four.

c. Cut the fuse leads at the end of the fuse and replace with a 3AG, 2 ampere pigtail fuse, by soldering it to the existing leads.

d. Replace the bottom dust cover and secure it to the instrument with the screws removed in step a.

e. The instrument is now ready for operation on all modes.

2-19. BATTERY REPLACEMENT

2-20. Battery replacement is necessary after extended use on the carbon battery, or upon failure of one or more of the nickel-cadmium cells. To replace the battery pack, proceed as follows:

a. Remove the four screws that attach the bottom dust cover to the instrument and remove the bottom dust cover from the instrument.

b. Locate the battery pack on the rear panel assembly. Disconnect the red and black battery pack wires from the printed circuit board terminals.

c. Remove the rear panel screws that secure the battery pack to the rear panel assembly and remove the battery pack from the instrument. If your instrument contains carbon batteries, perform steps d, and g through i of the following procedure. If your instrument contains rechargeable batteries, perform step e through i of the following procedure.

d. Replace the carbon battery pack with a new carbon battery pack using an Eveready 763 or equivalent, and secure it to the rear panel assembly with the screws removed in step c.

e. Locate the defective cell or cells in the rechargeable battery pack. Replace the cell or cells with an identical nickel-cadmium cell, Fluke part number 4002-160390. Observe proper polarity of connections when replacing nickel-cadmium cells.

f. Replace the rechargeable battery pack by securing it to the rear panel assembly with the screws removed in step c.

g. Connect the red and black battery pack wires to the printed circuit board terminals.

h. Replace the bottom cover and secure it to the instrument with the screws removed in step a.

i. Check the batteries as outlined in paragraph 2-3.

2-21. 230 VOLTS AC POWER LINE CONVERSION

2-22. The Model 853A may be converted for operation on 230 volt ac lines by modifying the input power transformer wiring. Factory modified versions will have a rear panel 230 volt decal installed. To convert the instrument from 115 volt line power to 230 volt line power, proceed as follows:

a. Remove the four screws that secure the top cover to the instrument and remove the top cover from the instrument.

b. Locate the printed circuit board connections in the left rear corner of the instrument labeled 115 and 230.

c. Remove the jumper wires from the 115 volt labeled terminals and solder them to the 230 volt labeled terminals.

d. Replace the rear panel fuse, F2, with a 3AG, 1/8 ampere slow-blow fuse.

e. Replace the top cover, securing it to the instrument with the screws removed in step a. The instrument will now operate on 230 volt ac power.

WARRANTY

The JOHN FLUKE MFG. CO., INC. warrants each instrument manufactured by them to be free from defects in material and workmanship. Their obligation under this Warranty is limited to servicing or adjusting an instrument returned to the factory for that purpose, and to making good at the factory any part or parts thereof; except tubes, fuses, choppers and batteries, which shall, within one year after making delivery to the original purchaser, be returned by the original purchaser with transportation charges prepaid, and which upon their examination shall disclose to their satisfaction to have been thus defective. If the fault has been caused by misuse or abnormal conditions of operation, repairs will be billed at a nominal cost. In this case, an estimate will be submitted before work is started, if requested.

If any fault develops, the following steps should be taken.

1. Notify the John Fluke Mfg. Co., Inc., giving full details of the difficulty, and include the Model number, type number, and serial number. On receipt of this information, service data or shipping instructions will be forwarded to you.

2. On receipt of the shipping instructions, forward the instrument prepaid, and repairs will be made at the factory. If requested, an estimate of the charges will be made before the work begins, provided the instrument is not covered by the Warranty.

SHIPPING

All shipments of John Fluke Mfg. Co., Inc. instruments should be made via Railway Express prepaid. The instrument should be shipped in the original packing carton; or if it is not available, use any suitable container that is rigid. If a substitute container is used, the instrument should be wrapped in paper and surrounded with at least four inches of excelsior or similar shock-absorbing material.

CLAIM FOR DAMAGE IN SHIPMENT

The instrument should be thoroughly inspected immediately upon receipt. All material in the container should be checked against the enclosed packing list. The manufacturer will not be responsible for shortages against the packing sheet unless notified immediately. If the instrument fails to operate properly, or is damaged in any way, a claim should be filed with the carrier. A full report of the damage should be obtained by the claim agent, and this report should be forwarded to John Fluke Mfg. Co., Inc. Upon receipt of this report you will be advised of the disposition of the equipment for repair or replacement. Include the model number, type number, and serial number when referring to this instrument for any reason.

The John Fluke Mfg. Co., Inc. will be happy to answer all application questions which will enhance your use of this instrument. Please address your requests to:

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THE UNITED KINGDOM

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WEST GERMANY

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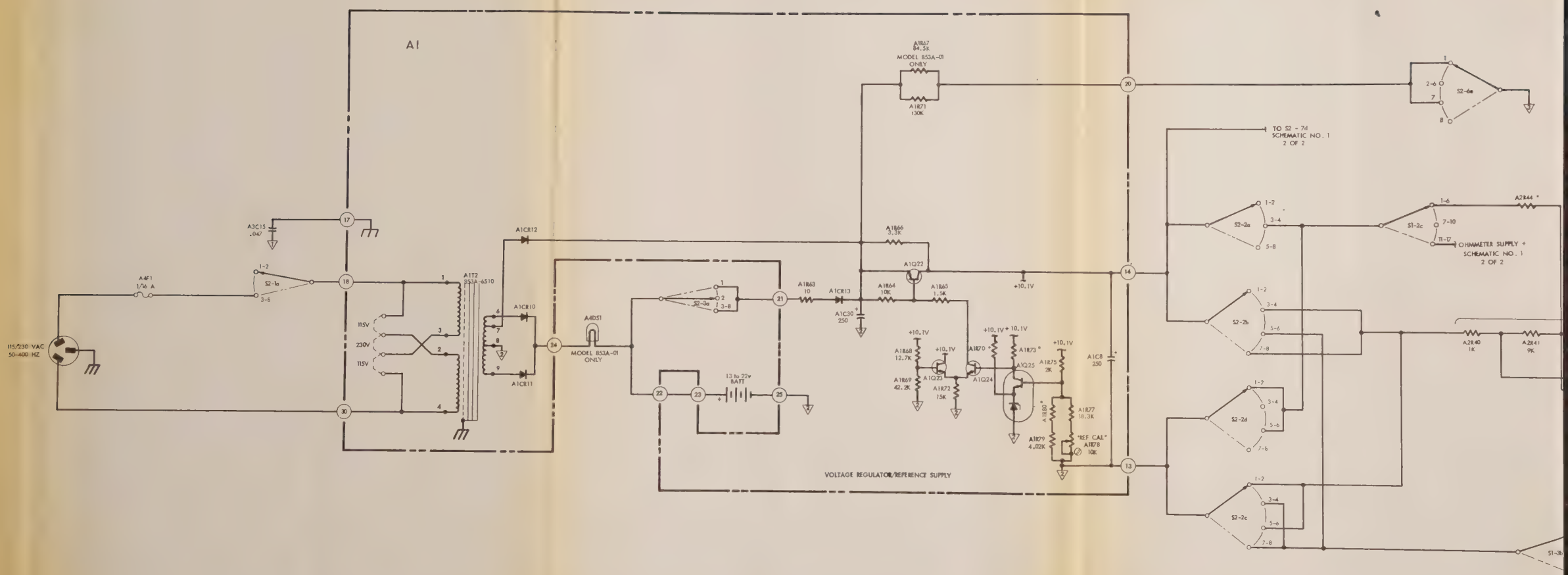
FLUKE


A1
A1R67
84.5K
MODEL 853A-01
ONLY
A1R71
130K
TO S2 - 7d
SCHEMATIC NO. 1
2 OF 2
A3C15
.047
A1CR12
A1R66
3.3K
A1Q22
A4F1
1/16 A
115/230 VAC
50-400 HZ
S2-1a
A1T2
853A-6510
115V
230V
115V
A1CR10
A1CR11
A4DS1
MODEL 853A-01
ONLY
S2-3a
A1R63
10
A1CR13
A1C30
250
A1R64
10K
A1R65
1.5K
+10.1V
A1R68
12.7K
A1R69
42.2K
A1Q23
A1R72
15K
A1R70
A1Q24
A1R73 *
A1Q25
A1R75
2K
A1R80 *
A1R79
4.02K
A1R77
18.3K
"REF CAL"
A1R78
10K
A1C8
250
13 to 22v
BATT
VOLTAGE REGULATOR/REFERENCE SUPPLY
S2-6a
S2-2a
S2-2b
S2-2d
S2-2c
S1-2c
OHMMETER SUPPLY +
SCHEMATIC NO. 1
2 OF 2
A2R44 *
A2R40
1K
A2R41
9K
S1-3b

NOTES:

A1- P/C BOARD ASSEMBLY
A2- RANGE SWITCH ASSEMBLY
A3- MODE SWITCH ASSEMBLY
A4- FINAL ASSEMBLY
A5- DECADE POTENTIOMETER, DECK "A", ASSEMBLY
A6- DECADE POTENTIOMETER, DECK "B", ASSEMBLY
A7- FRONT PANEL ASSEMBLY

FLAGNOTES INDICATE CIRCUIT CONNECTIONS TO LIKE FLAGNOTES

ALL CAPACITOR VALUES ARE IN uf UNLESS OTHERWISE NOTED

FACTORY SELECTED COMPONENT

NUMBERS CONTAINED ON SWITCHES ARE SWITCH POSITIONS

REFERENCE COMMON

REFERENCE SUPPLY NEGATIVE RETURN

NULL DETECTOR COMMON #1

NULL DETECTOR COMMON #2

SWITCH FUNCTIONS

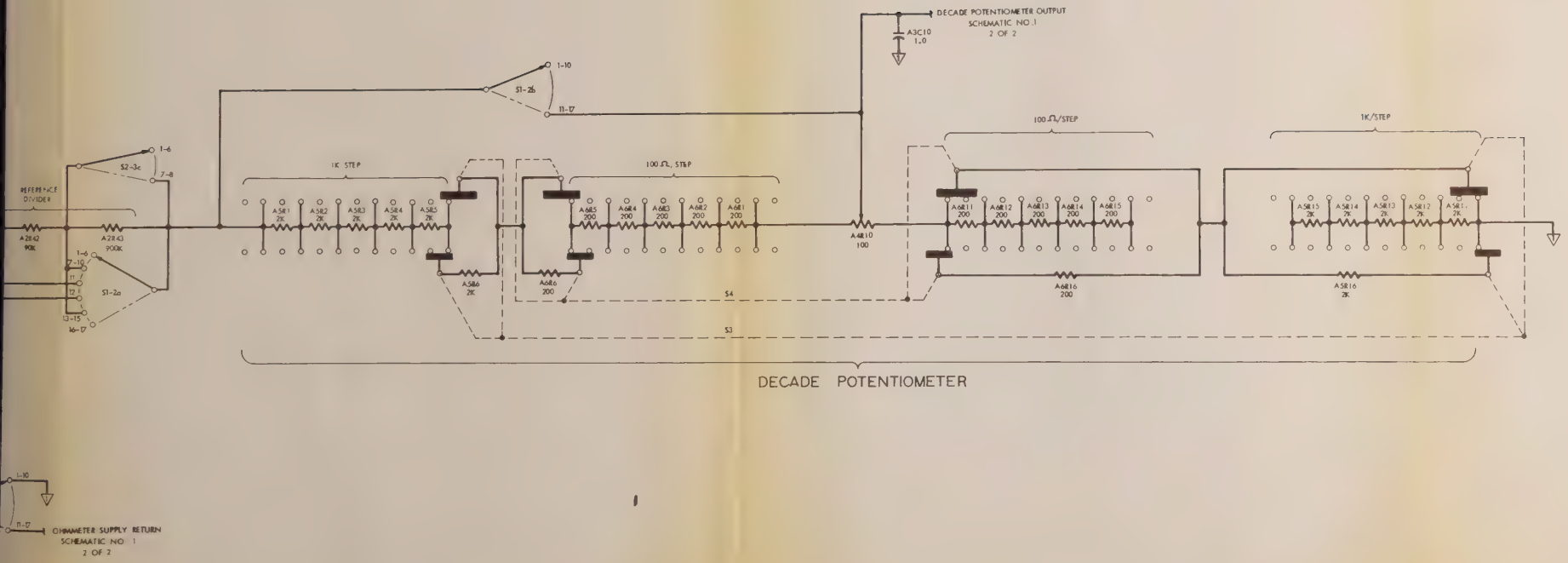
MODE SWITCH - S2	
POSITION	FUNCTION
1	BAT CHK
2	OFF
3	+ DC DIR
4	+ DC DIFF
5	- DC DIR
6	DC DIFF
7	AC DIR
8	AC DIFF

RANGE SWITCH - S1	
POSITION	FUNCTION
1	1 MA
2	1 MA
3	10 MA
4	100 MA
5	1000 MA
6	10 A
7	1 VOLTS
8	10 VOLTS
9	100 VOLTS
10	1000 VOLTS
11	100M OHMS
12	10M OHMS
13	1M OHMS
14	100K OHMS
15	10K OHMS
16	1K OHMS
17	100 OHMS

SWITCH NOTES

S1 - 4 a

S1 - SWITCH NO. 4 - DECK NO. a - FUNCTION



FUNCTIONAL SCHEMATIC

SCHEMATIC NO. 1 OF 2

MULTIMETER

MODEL 853A

SER NO 123 & ON

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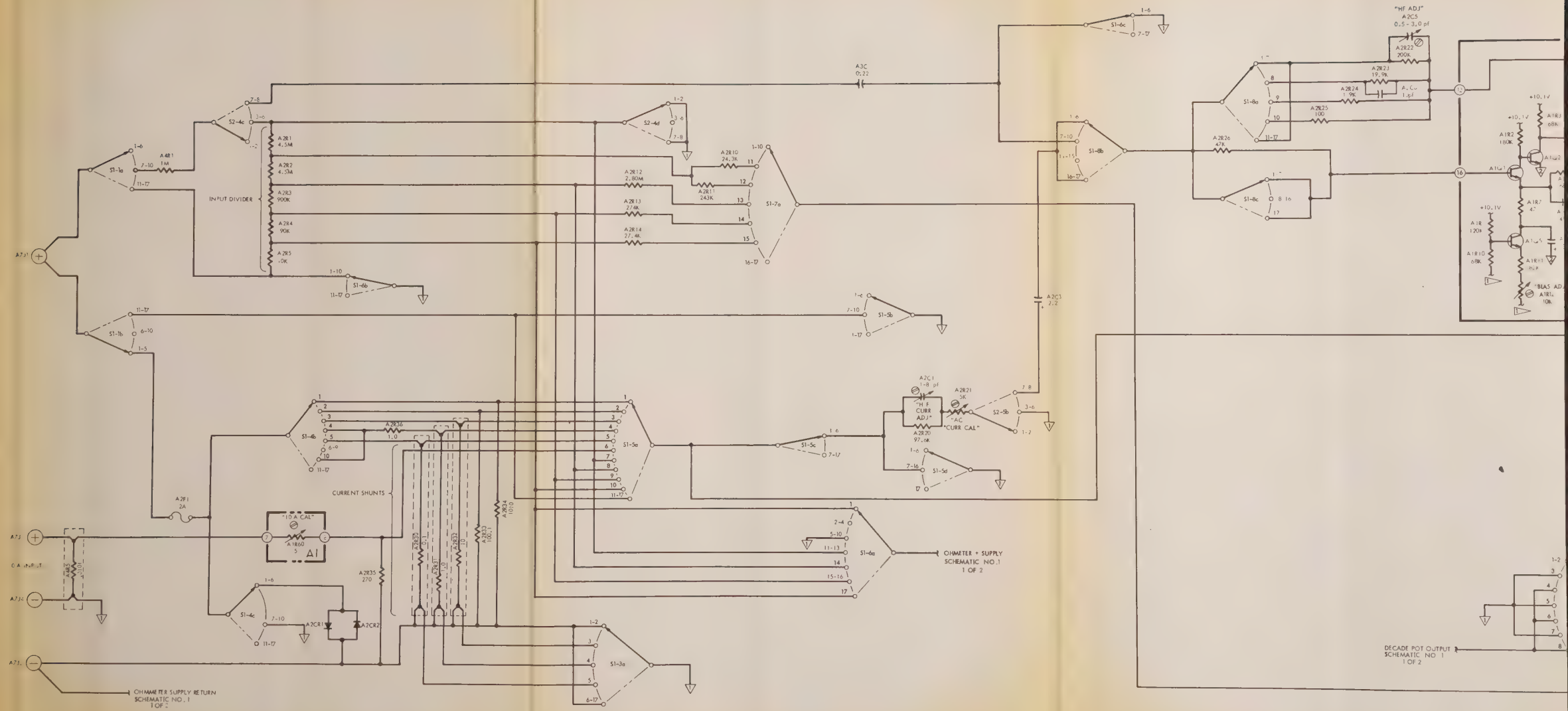
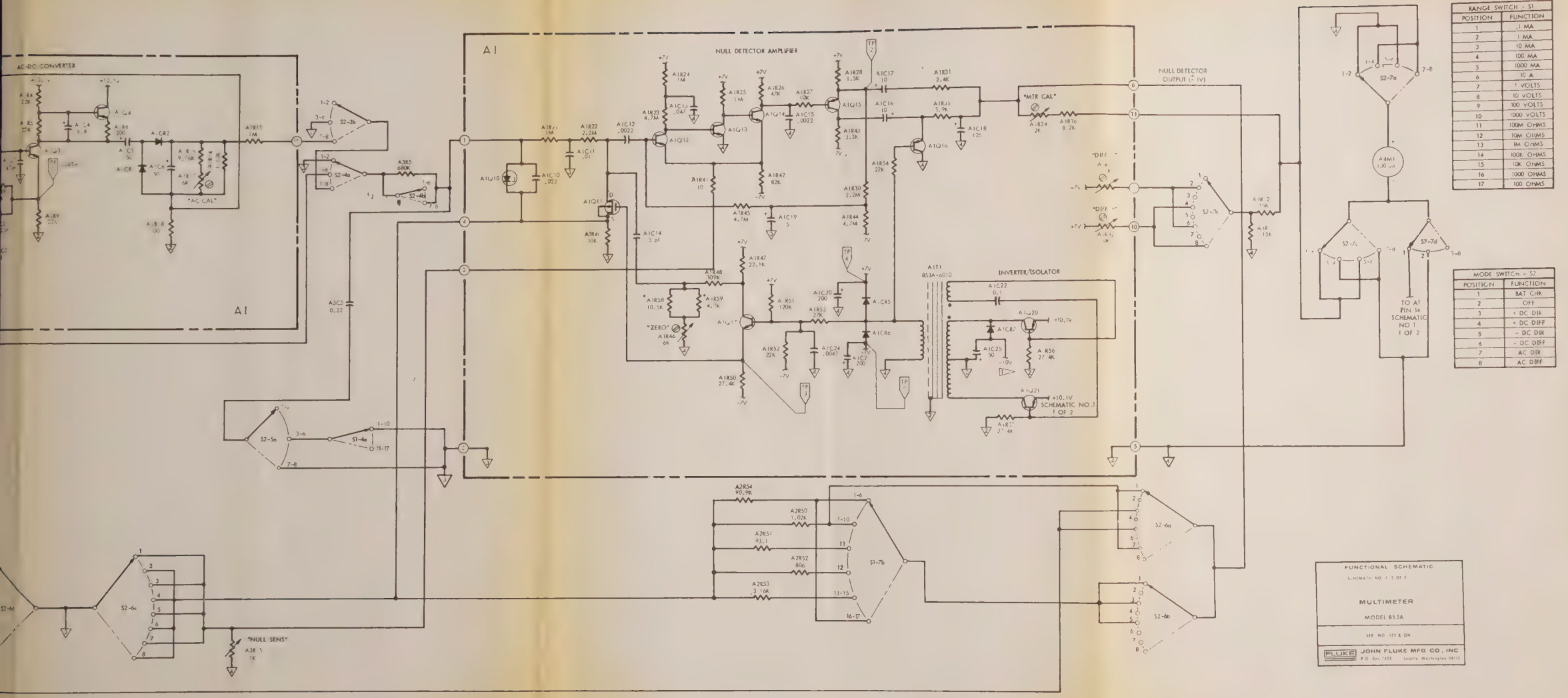
P.O. Box 7428 Seattle Washington 98133


INPUT DIVIDER
CURRENT SHUNTS
"HF ADJ"
"HF CURR ADJ"
"AC CURR CAL"
"110 A CAL"
"BIAS ADJ"
OHMMETER + SUPPLY SCHEMATIC NO. 1 1 OF 2
OHMMETER SUPPLY RETURN SCHEMATIC NO. 1 1 OF 2
DECADE POT OUTPUT SCHEMATIC NO. 1 1 OF 2

NOTES:
FOR NOTES SEE SCHEMATIC NO. 1 1 OF 2

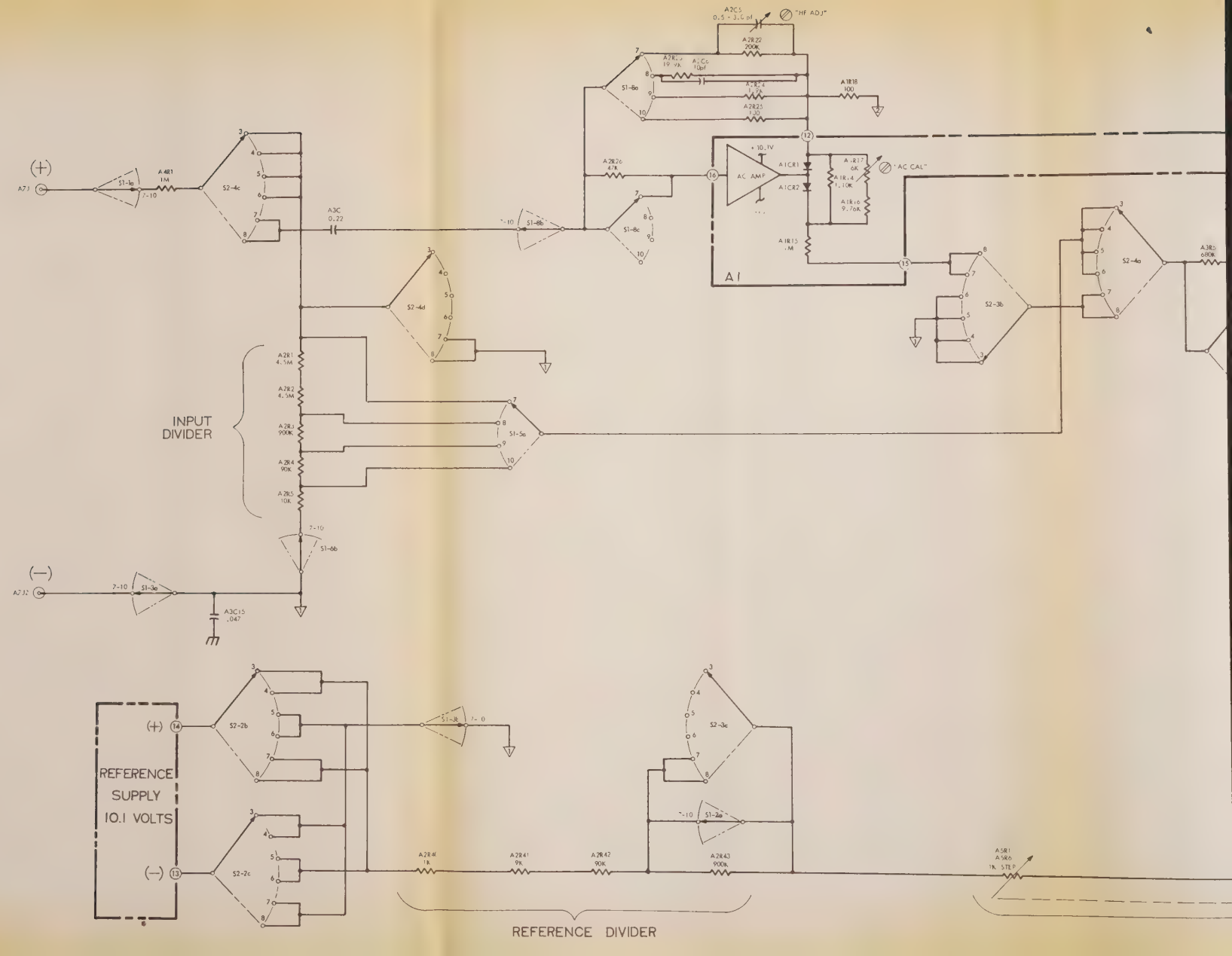


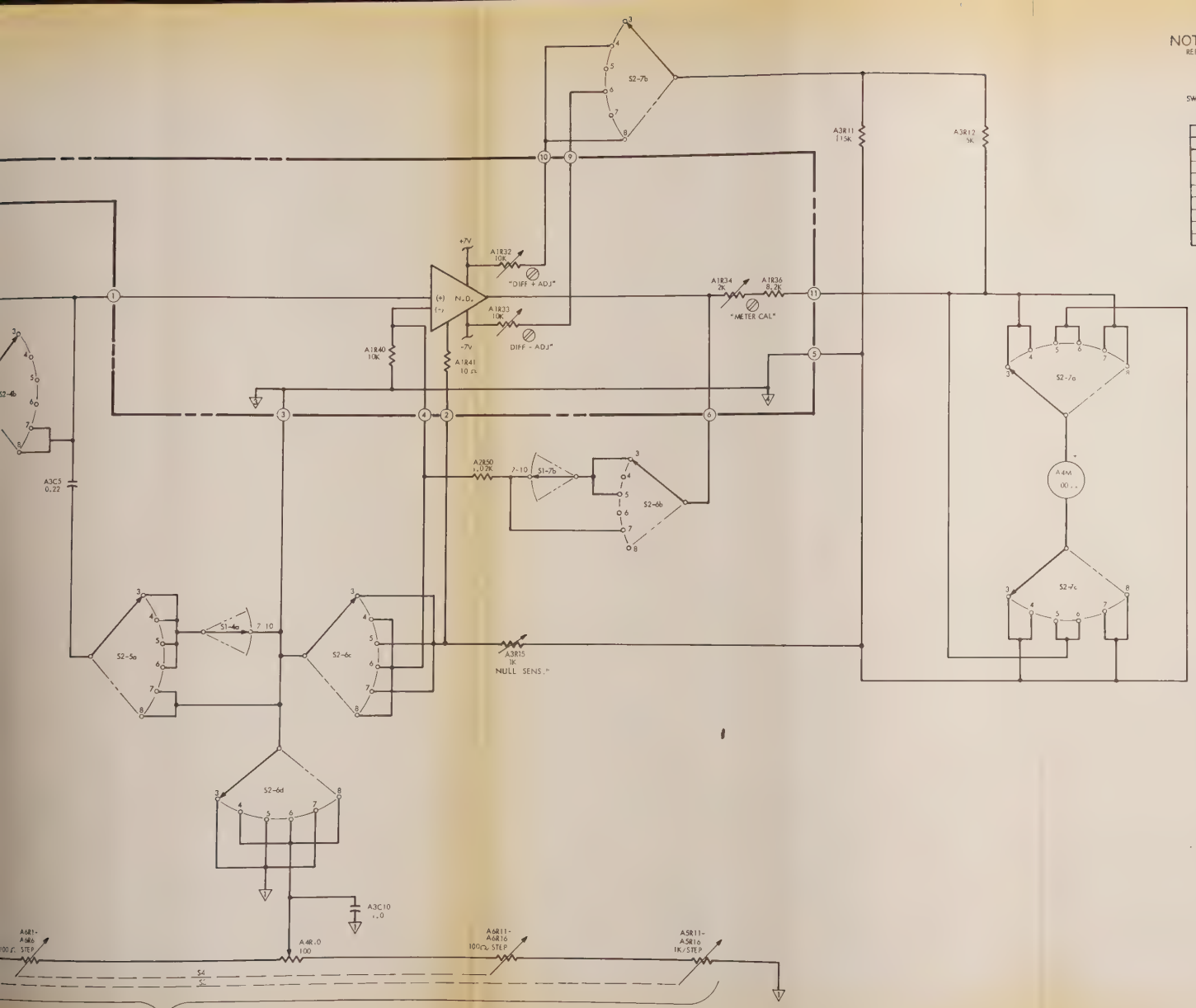
SWITCH FUNCTIONS:

RANGE SWITCH - S1	
POSITION	FUNCTION
1	.1 MA
2	1 MA
3	10 MA
4	100 MA
5	1000 MA
6	10 A
7	1 VOLTS
8	10 VOLTS
9	100 VOLTS
10	1000 VOLTS
11	100M OHMS
12	10M OHMS
13	1M OHMS
14	100K OHMS
15	10K OHMS
16	1000 OHMS
17	100 OHMS

MODE SWITCH - S2	
POSITION	FUNCTION
1	BAT CHK
2	OFF
3	+ DC DIR
4	+ DC DIFF
5	- DC DIR
6	- DC DIFF
7	AC DIR
8	AC DIFF

FUNCTIONAL SCHEMATIC
SCHEMATIC NO. 1 2 OF 2
MULTIMETER
MODEL 853A
SER NO 123 & ON
FLUKE JOHN FLUKE MFG. CO., INC
P.O. Box 7428 Seattle Washington 98133


A2C5
0.5 - 3.6 pf
"HF ADJ"
A2R22
200K
A2R21
19 vk
A2C6
10pf
A2R24
1.9k
A2R25
1.00
A1R18
100
S1-8a
S1-8b
S1-8c
A2R2c
47k
+10.1V
AC AMP
A1CR1
A1CR2
A1R17
6K
A1R14
1.10K
A1R16
9.76K
"AC CAL"
A1R15
.1M
A1
S2-4a
S2-3b
A3R2
680K
(+)
A7J1
A4R1
1M
S1-1a
7-10
S2-4c
A3C
0.22
-10
S2-4d
INPUT
DIVIDER
A2R1
4.5M
A2R2
4.5M
A2R3
900K
A2R4
90K
A2R5
10K
S1-5a
S1-6b
(—)
A7J2
S1-3a
A3C15
.047
REFERENCE
SUPPLY
10.1 VOLTS
(+)
(—)
S2-2b
S2-2c
S1-3b
S2-3c
S1-2a
A2R41
9k
A2R42
90K
A2R43
900k
A5R1
A5R6
1K STEP
REFERENCE DIVIDER



NOTES:

REFER TO SCHEMATIC NO. 1 1 OF 2 FOR NOTES

SWITCH FUNCTIONS

MODE SWITCH - S2	
POSITION	FUNCTION
1	BAT CHK
2	OFF
3	- DC DIR
4	+ DC DIFF
5	- DC DIR
6	DC DIFF
7	AC DIR
8	AC DIFF

RANGE SWITCH - S1	
POSITION	FUNCTION
1	1 MA
2	1 MA
3	10 MA
4	100 MA
5	1000 MA
6	10 A
7	1 VOLTS
8	10 VOLTS
9	100 VOLTS
10	1000 VOLTS
11	100M OHMS
12	10M OHMS
13	1M OHMS
14	100K OHMS
15	10K OHMS
16	1000 OHMS
17	100 OHMS

FUNCTIONAL SCHEMATIC

SCHEMATIC NO. 2

VOLTMETER MODE AC & DC

MODEL 853A

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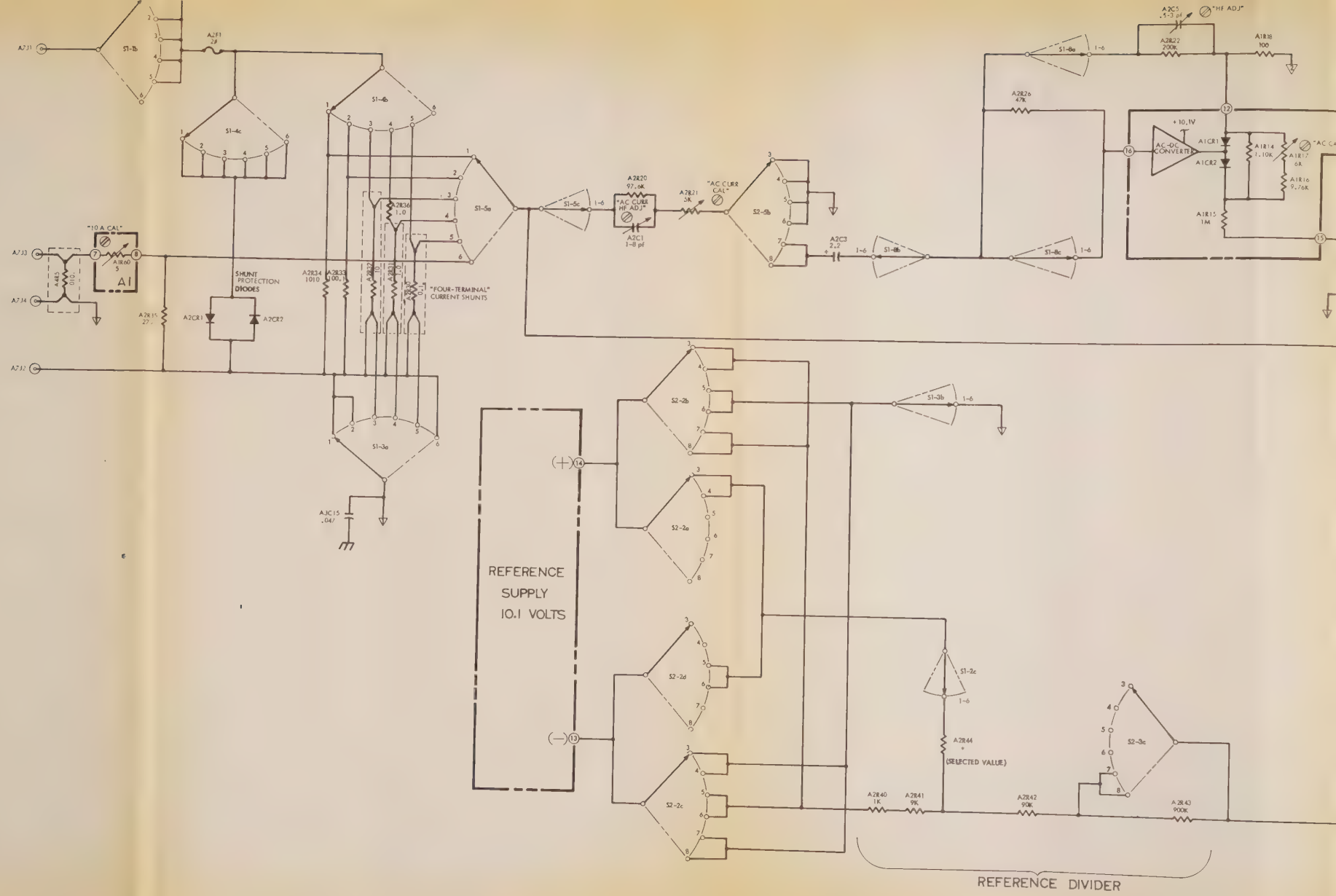
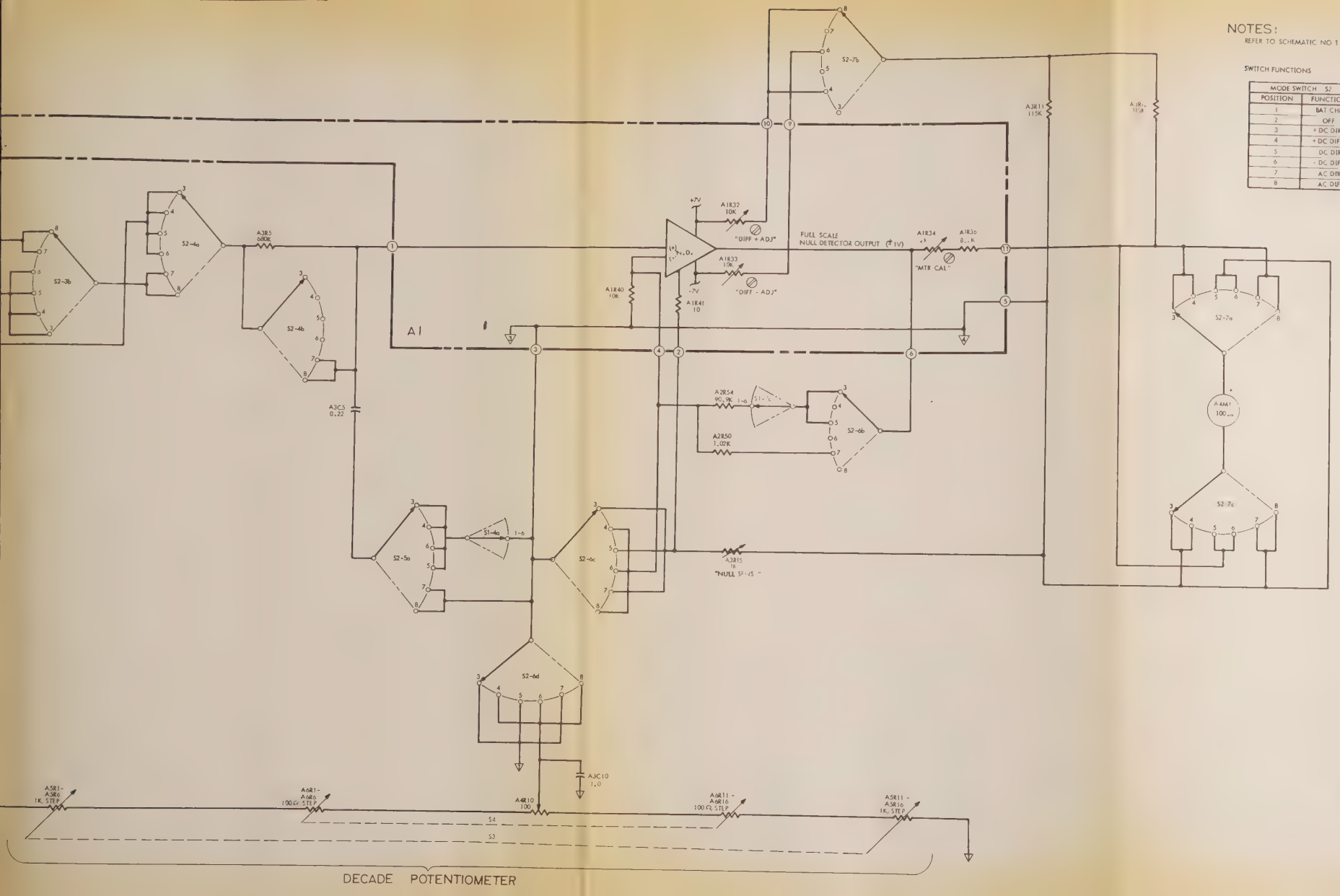

A2J1
A2J3
A2J4
A2J2
S1-1b
A2F1
2A
S1-4c
S1-4b
S1-5a
S1-5c
A2R20
97.6K
"AC CURR HF ADJ"
A2C1
1-8 pf
A2R21
5K
"AC CURR CAL"
S2-5b
A2C3
2.2
S1-6b
S1-6a
S1-6c
A2C5
.5-3 pf
"HF ADJ"
A2R22
200K
A1R18
100
A2R26
47K
+10.1V
AC-DC CONVERTER
A1CR1
A1CR2
A1R14
1.10K
A1R17
6R
A1R16
9.76K
A1R15
1M
"10 A CAL"
A1R60
5
A1
.485
10 Ω
SHUNT PROTECTION DIODES
A2CR1
A2CR2
A2R35
27
A2R34
1010
A2R33
100
A2R32
10
A2R31
1.0
A2R30
.01
"FOUR-TERMINAL" CURRENT SHUNTS
S1-3a
A3C15
.047
REFERENCE SUPPLY 10.1 VOLTS
(+)14
(−)13
S2-2b
S2-2a
S2-2d
S2-2c
S1-3b
S1-2c
A2R44
(SELECTED VALUE)
S2-3c
A2R40
1K
A2R41
9K
A2R42
90K
A2R43
900K
REFERENCE DIVIDER



NOTES:

REFER TO SCHEMATIC NO 1 1 OF 2 FOR NOTES

SWITCH FUNCTIONS

MODE SWITCH S2	
POSITION	FUNCTION
1	BAT CHK
2	OFF
3	+ DC DIR
4	+ DC DIFF
5	DC DIR
6	- DC DIFF
7	AC DIR
8	AC DIFF

RANGE SWITCH - S1	
POSITION	FUNCTION
1	.1 MA
2	1 MA
3	10 MA
4	100 MA
5	1000 MA
6	10 A
7	1 VOLTS
8	10 VOLTS
9	100 VOLTS
10	1000 VOLTS
11	100M OHMS
12	10M OHMS
13	1M OHMS
14	100K OHMS
15	10K OHMS
16	1000 OHMS
17	100 OHMS

FUNCTIONAL SCHEMATIC

SCHEMATIC NO. 2

AMMETER MODE AC & DC

MODEL 853A

SER NO 123 & ON

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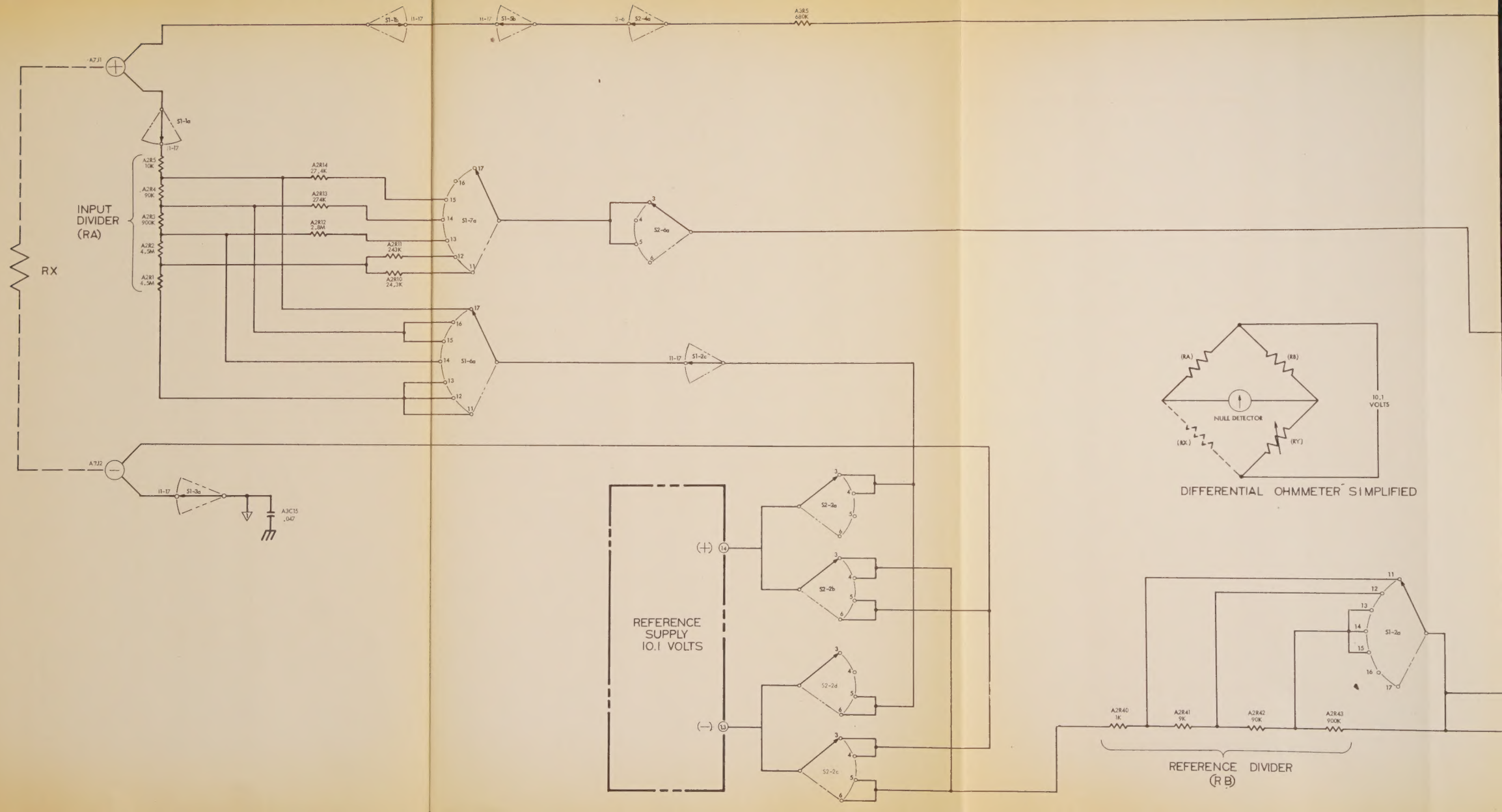
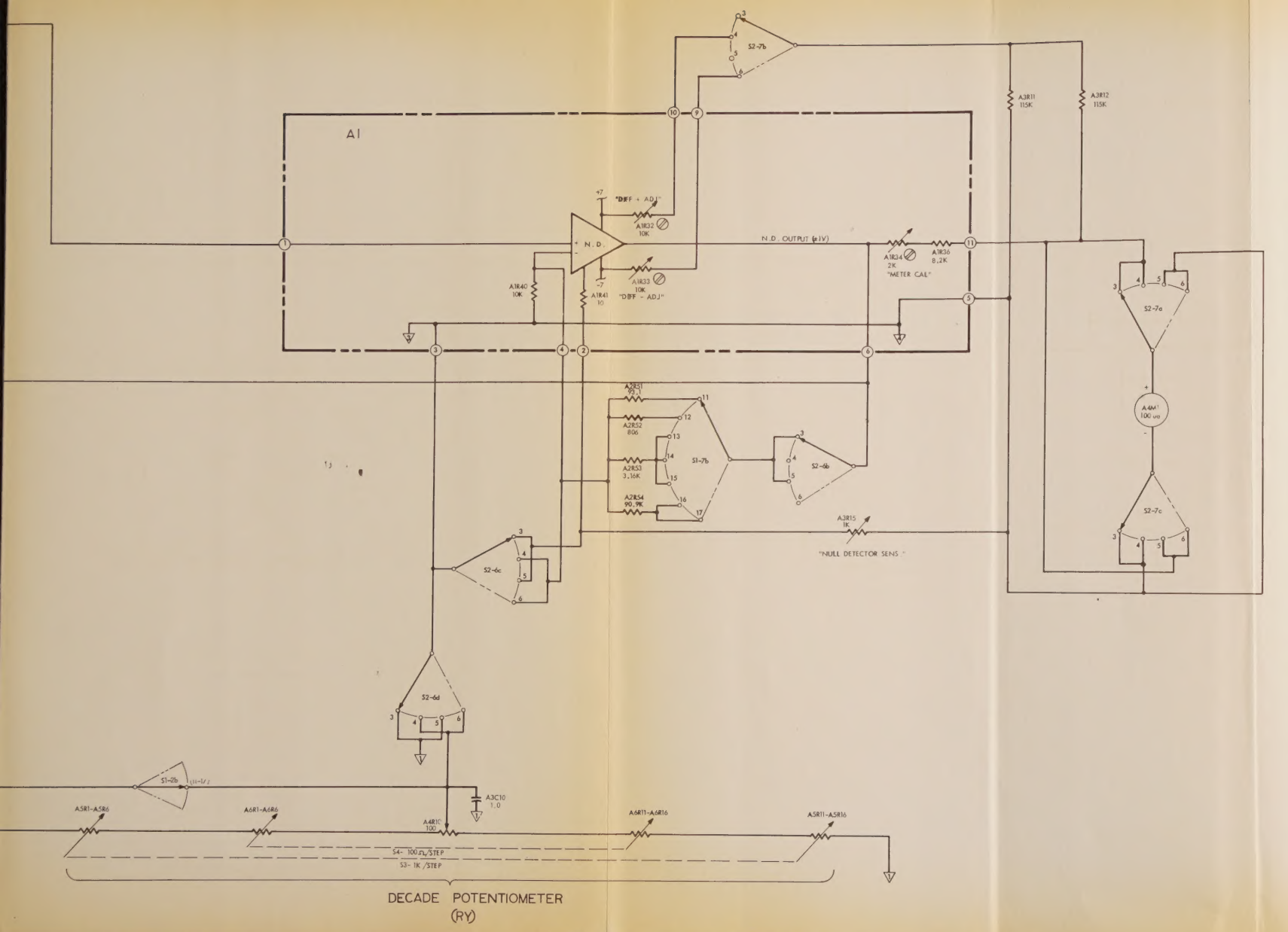

A7J1
A7J2
RX
INPUT DIVIDER (RA)
A2R5 10K
A2R4 90K
A2R3 900K
A2R2 4.5M
A2R1 4.5M
A2R14 27.4K
A2R13 274K
A2R12 2.8M
A2R11 243K
A2R10 24.3K
S1-1a
S1-1b
S1-2a
S1-2c
S1-3a
S1-5b
S1-6a
S1-7a
S2-2a
S2-2b
S2-2d
S2-2c
S2-4a
S2-6a
A3R5 680K
A3C15 .047
11-17
3-6
REFERENCE SUPPLY 10.1 VOLTS
(+) 14
(−) 13
A2R40 1K
A2R41 9K
A2R42 90K
A2R43 900K
REFERENCE DIVIDER (RB)
(RA)
(RB)
(RX)
(RY)
NULL DETECTOR
10.1 VOLTS
DIFFERENTIAL OHMMETER SIMPLIFIED



NOTES:

REFER TO SCHEMATIC NO. 1 1 OF 2 FOR NOTES

SWITCH FUNCTIONS:

MODE SWITCH - S2	
POSITION	FUNCTION
1	BAT CHK
2	OFF
3	+ DC DIR
4	+ DC DIFF
5	- DC DIR
6	- DC DIFF
7	AC DIR
8	AC DIFF

RANGE SWITCH - S1	
POSITION	FUNCTION
1	.1 MA
2	1 MA
3	10 MA
4	100 MA
5	1000 MA
6	10 A
7	1 VOLTS
8	10 VOLTS
9	100 VOLTS
10	1000 VOLTS
11	100M OHMS
12	10M OHMS
13	1M OHMS
14	100K OHMS
15	10K OHMS
16	1000 OHMS
17	100 OHMS

FUNCTIONAL SCHEMATIC

SCHEMATIC NO. 4

OHMMETER MODE

MODEL 853A

SER. NO. 133 & ON

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